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FMSPS: A FOREIGN MILITARY SALES PAYMENT SCHEDULING COMPUTER PRO--ETC(U)
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PAYMENT SCHEDULING COMPUTER PROGRAM.

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William A. Oxandale

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U.S. ARMY AVIATION SYSTEMS COMMAND

Systems Analysis Office

Developmental Systems Projects Division

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Fort Belvoir, Illinois

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) A computer program was developed to automate the payment scheduling procedure for foreign military sales items. This procedure improves the quality and reduces the processing times as compared to previous hand calculated methods.		

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1. INTRODUCTION

When a foreign government wishes to purchase military equipment from a US manufacturer, it usually does so through the DOD department which manages the equipment. In the case of military helicopters, the foreign government arranges with the Army to contract with the appropriate vendor taking advantage of any economies of scale made available through consolidation of orders. For each such arrangement a schedule of payments is then developed by the Army which reflects the obligation expected at any time during the life of the contract. The subject foreign government then agrees to meet that schedule of payments, thus assuring that sufficient funds will be on hand to satisfy the month-to-month contract costs incurred by the Army.

In the past, when foreign military sales (FMS) volume was relatively low, the calculations for the schedule of payments were done by hand. However, with the sharp increase in volume experienced since 1973, it has become increasingly apparent that a more sophisticated, automated procedure was needed. Not only has the quantity of calculations increased dramatically, the complexity of the scheduling procedure has also increased. More specialized arrangements are being made for optional equipment and services which alter the payment scheduling algorithm. In addition a new mathematical model, incorporating an exponential component, has been developed to describe the cost-incurred profile of the contractor (USAAVSCOM Technical Report 7-44, Cost of Terminating Contracts Study, November 1976). The result has been that hand calculations have become so extensive, complex, and unwieldy as to be no longer feasible nor practical. From the standpoint of the volume and complexity of the work, and from the standpoint of consistent accuracy of calculations, the automation of the payment scheduling procedure was clearly indicated.

With the above background in mind, the Directorate for International Logistics established a requirement for an automated payment scheduling system and requested that the Systems Analysis Office analyze the specific requirements and develop a computer program structure, methodology, and printout adequate to meet the FMS payment scheduling task.

2. PROGRAM DESCRIPTION

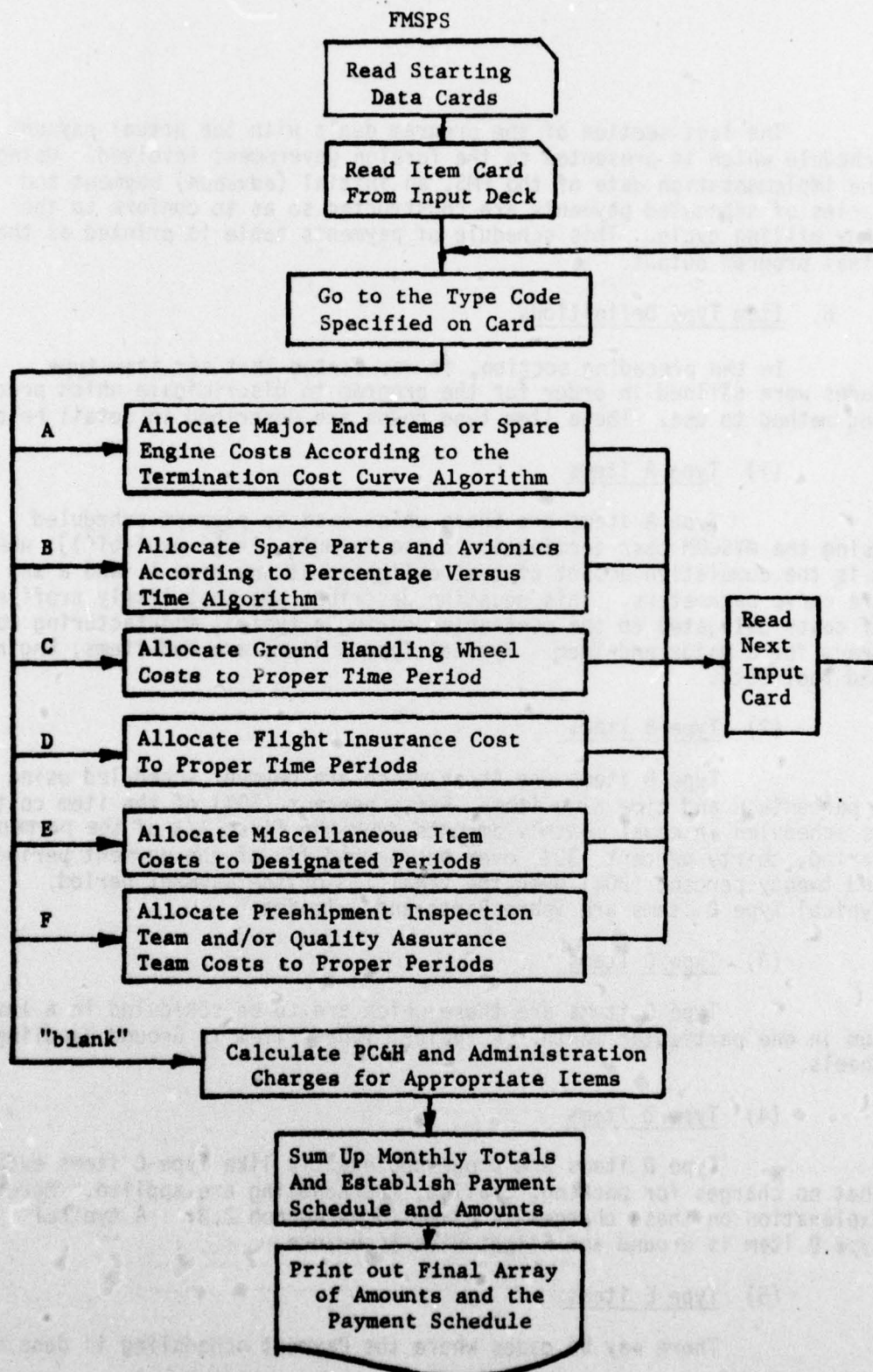
The result of the Systems Analysis Office effort was a computer program named FMSPS (Foreign Military Sales Payment Scheduling). This program uses basic cost and contract duration data to formulate an estimate of the month-by-month accumulation of obligated cost as work progresses through the term of the contract. Then, a schedule of payments is constructed from the monthly totals which is consistent with the Army billing cycle. A detailed description of the program structure, methodology, and output follow.

a. Program Structure

FMSPS was developed with several goals in mind. First, it should provide a fast, automatic payment scheduling capability. Second, it should be flexible enough to handle virtually any conceivable FMS case, no matter how large or diverse the number of items. And third, it should be easy to learn to use by personnel with limited computer knowledge.

Initially, it was necessary to resolve the problem of how to handle the diversity of items processed. Each FMS case involved several different types of items, each of which could require a different processing method. Since the computer program must be able to recognize which items are to be processed by each method, it was necessary to categorize the item by processing method to be used. Analysis revealed that five categories, or types, were needed. A sixth all-purpose type was added to accommodate any other method which might arise. A code letter (A through F) was then assigned to each type, and the computer program was designed to read, identify, and process each item by code letter (see paragraph 2.2).

Having established the item type coding, the computer program was designed to operate as described below (refer to the program flow chart on page 3). Four general case cards are read which contain data applicable to all items (e.g., case name and duration). Thereafter, the item cards are read and processed one at a time until all items are processed. The processing of each card consists of sensing the item code, transfer of control to the proper set of instructions for that type item, calculation of the item payments and how they will be allocated over time, and finally summing those results into a master payment schedule matrix by item type. The master payment schedule matrix is a 9 x 30 array for accumulating the individual payment schedules of each item month by month. When the last card of the input deck is read, the program proceeds to calculate Packing, Crating, and Handling charges, and Administrative charges for appropriate items. These charges are also stored in the master payment schedule matrix and the matrix is printed as program output.



The last section of the program deals with the actual payment schedule which is presented to the foreign government involved. Using the implementation date of the FMS, an initial (advance) payment and series of scheduled payments are constructed so as to conform to the Army billing cycle. This schedule of payments table is printed as the final program output.

b. Item Type Definitions

In the preceding section, it was stated that six item type codes were defined in order for the program to discriminate which processing method to use. These item type codes are described in detail below:

(1) Type A Items

Type A items are those which must be payment scheduled using the AVSCOM cost termination curve formula, $P=a[1-\exp(-bT^2)]$; where P is the cumulative amount of cost obligated at any time T, and a and b are curve parameters. This equation describes the most likely profile of costs obligated to the contractor during a typical manufacturing contract for a major end-item. Typical Type A items are End-Items, Engines, and Tool Sets.

(2) Type B Items

Type B items are those which are payment scheduled using a percentage and time algorithm. Fifty percent (50%) of the item cost is scheduled in equal monthly amounts over the first 1/3 of the payment period, thirty percent (30%) over the second 1/3 of the payment period and twenty percent (20%) over the final 1/3 of the payment period. Typical Type B items are Spare Parts and Avionics.

(3) Type C Items

Type C items are those which are to be scheduled in a lump sum in one particular month. A typical Type C item is Ground Handling Wheels.

(4) Type D Items

Type D items are processed exactly like Type C items except that no charges for packing, crating, and handling are applied. More explanation on these charges is given in paragraph 2.3. A typical Type D item is Ground and Flight Risk Insurance.

(5) Type E Items

There may be cases where the Payment scheduling is done by

some hybrid special purpose algorithm. To allow for the input of a complete set of scheduled payments over a period of months, Type E items were defined. Starting with the first implementation month, amounts are sequentially assigned month by month for up to 60 months.

(6) Type F Items

Type F items are for quality assurance support. There are two kinds of support; the Quality Assurance Team (QAT), and the Preshipment Inspection Team (PIT). The cost for QAT is always scheduled in the last delivery month for the item supported. The cost for PIT is scheduled in equal monthly amounts over the remaining delivery months. Thus, if there is a QAT cost, the PIT cost will be scheduled in all but the last delivery month. If there is only one delivery month, the QAT cost, or the PIT cost, or both will be scheduled for that month.

c. Packing, Crating, and Handling Charges

On certain type items, it is necessary to calculate a percentage charge for Packing, Crating, and Handling (PC&H). The percentage used in the program is an input parameter. The PC&H charges are automatically calculated for Type B and C items, and optional (controlled by input code) for Type A and E items. No provision is made for calculating PC&H charges on Type D or F items since these are services.

d. Administrative Charges

An administrative charge is calculated as a percentage of all items costs (optional on Type E items as specified by input code). It is not calculated on PC&H charges. The percentage used is an input parameter.

e. Program Output

The output of the program consists of three sections: the printout of the input data, the table of monthly obligations as projected for each item type and charge, and finally the schedule of payments for the term of the FMS agreement.

(1) Printout of Input Data

The data printed on the first page is exactly what the computer reads from the input deck. It is purely for use in checking on the correctness of the input information and the keypunching (if data is punched in the wrong columns, it may be interpreted wrong by the computer). In the event that an input card contains an obvious error, the program will print an error message, ignore the card, and continue on with the next data card. More discussion of program error checks is provided in paragraph 2.6.

(2) The Master Payment Schedule Matrix

The second section of the printout contains a table of the accumulated obligations for each item type, for each month, plus the monthly charges for PC&H and Administration. The subtotal column includes only item type amounts, while the total (at the right side) includes item type amounts plus PC&H and Administration charges.

(3) Payment Schedule

The third section contains the schedule of payments beginning with the initial advance payment. Payments are listed according to billing month through the term of the agreement. At the bottom of the table is a calculated total. That total is compared with an input total (from DD Form 1513), and the difference printed. If the difference is not very close to zero, there is probably a mistake in the input deck and the input data should be thoroughly checked.

f. Program Error Checks

Two kinds of errors are possible in the input deck, those which are simply numerical mistakes, and those which cause enough of a computer system software problem so that the run is aborted. The computer system software error checks are automatic and cannot be circumvented. In general, the computer system will terminate the run whenever the input data cannot be read per program instruction. Typical causes can be the use of improper characters (e.g. /, %, or *), or the use of (or failure to use) decimal points in the proper places.

With respect to numerical mistakes, the program checks input data to identify errors wherever possible during processing. Where certain required data is missing, or where program limits are exceeded (e.g., 60-month case limit), the program can identify the problem and print out a message. When an error is found, the data card is skipped, an error message is printed, and processing continues with the next data card. To the extent possible then, the program serves as an aid in debugging the input data cards.

3. USER'S GUIDE

Included as Appendix C is a User's Guide for the FMSPS program. It has been written so as to be independent of this report and may be detached and used separately for convenience. Thus, there is a great deal of redundancy between that appendix and the main body of this report. The suggested worksheet (Appendix D) is designed for use with the User's Guide, and it is recommended that the two Appendices be kept together if detached.

4. PROGRAM EFFECTIVENESS

During the first month of use, a total of 19 cases were run on the computer program, providing a good test for set-up procedures, user convenience, and general program adequacy. It was found that substantial savings were experienced in the cost of processing those cases. Prior to automating the procedure, approximately 24 manhours were required to perform and record the computations for the payment schedule of one FMS case. A GS-11 Logistics Management Specialist was required. With the automated system, a GS-4 clerk could perform the same job in one-half an hour. In addition, the computer program affords a consistency of computation, accuracy, and format which could not be attained before.

Thus, it has been found the FMSPS provides for a significant reduction in both the number of hours necessary to process the FMS payment schedules, and in the skill level of the personnel involved. The result is a more accurate, less costly, and more professional product.

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APPENDIX A
PRINTOUT OF PROGRAM

C
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C

PROGRAM FMSPS

```

999 FORMAT(10A1)
998 FORMAT(2X,A1,F15.2,F10.2,3I6)
997 FORMAT(6F12.2)
996 FORMAT(80A1)
995 FORMAT(2F15.3,2F10.4)
994 FORMAT(1M)
993 FORMAT(2X,A1,17,2110)
992 FORMAT(1M1//RX,DATA FOR PROGRAM FMSPS,/)
991 FORMAT(1M1//50X,TRANSFER PAYMENT SCHEDULE/24X,A0A1//)
990 FORMAT(5X,CASE INFORMATION DATE,1,4,1 19,12,54X,
1PC6M - 1,6,3,1,5X,ADMIN - 1,6,3,1,5X)
987 FORMAT(4X,MONTH,9X,A1,11X,R,9X,1,6,3,1,5X,E,11X,
1,6,10X,SUMTOTAL,7X,PC6M,5X,ADMIN,5X,TOTALS,/)
986 FORMAT(3X,A4,1 19,12,54X,2,6,12,2,6,12,2,6,15,2,
1,6,12,2,6,15,2)
985 FORMAT(1M1//10X,TRANSFER PAYMENT SCHEDULE,1,6,10X,PAYMENTS,
1,6X,DATE,1,6X,ADMIN)
984 FORMAT(40X,INITIAL,1,12X,A4,1 19,12,54X,2)
983 FORMAT(3X,1A,15X,A4,1 19,12,54X,2)
982 FORMAT(10X,CALCULATED TOTAL,1,6,12,2)
981 FORMAT(13(10X,))
980 FORMAT(10X,1,6,12,2,6,15,2)
1,6X,10X - SPARE PARTS FOR END ITEM/AVIONICS,1,12X,C60 - 1,
2,6X,10X - GROUND HANDLING FUELS/FLIGHT INSURANCE,1,14X,E - 1,
3,6X,10X - MISCELLANEOUS ITEMS NOT INCLUDED ABOVE,1,14X,F - QUALITY 1,
4,6X,10X - ACCIDENT SUPPORT 1,
5,6X,10X - PRESHIPMENT INSP TEAM/QUALITY ASSURANCE TEAM,1,11X,PC6M - 1,
6,6X,10X - PACKING, CRATING, AND SHIPPING CHARGES FOR ITEMS B,C & E,1,
7,6X,10X,1,10X,ADMIN - ADMINISTRATIVE CHARGES FOR ITEMS A, R,1,
8,6X,10X,E, & F,1,6,3,1,5X)
979 FORMAT(5X,CANNOT FIND ALPHA = 1,A1)
978 FORMAT(13X,11(5X,))
977 FORMAT(49X,TOTAL FROM DD FORM 1513,1,6,12,2,6,12,2,6,15,2,DIFFERENCE,
1,6,12,2)
976 FORMAT(10X,CASE NUMBER EXCEEDS 60 MONTH PROGRAM LIMIT,1,
1,6X,TERMINATED)
975 FORMAT(10X,CASE CARD 3 OR 4 MISSING, RUN TERMINATED)
974 FORMAT(10X,CASE CARD 2 MISSING, RUN TERMINATED)
973 FORMAT(10X,COST OR PRODUCTION TIME SET TO ZERO, CARD 1,
1,6X,TERMINATED)
972 FORMAT(10X,LEAD TIME EXCEEDS PRODUCTION TIME, CARD SKIPPED)
971 FORMAT(10X,CANNOT DETERMINE NUMBER OF DATA VALUES TO 1,
1,6X,TERMINATED)
970 FORMAT(10X,ROTH DAT AND PIT ARE ZERO, CARD SKIPPED)
967 FORMAT(1M,50X,PC6M CALCULATED FOR THIS ITEM)
966 FORMAT(1M,50X,NO PC6M CALCULATED FOR THIS ITEM)

```



```

C C C
      REFIN PROGRAM
      OFALOR PS(9,001)P(60)TC,X,Y,VS,COST,PT
      DIMENSION MFAN(80),C(10),MM(12)
      DATA MON/ JAN, FEB, MAR, APR, MAY, JUN, JUL,
      AUG, SEP, OCT, NOV, DEC/
      INTEGER PT
      DO 5 I=1,9
      DO 5 J=1,60
      S=0
      DO 10 I=1,60
      10 S=I*MM
      C C C
      READ PROGRAM INPUT
      MFAN(5,999)(C(1),I=1,10)
      WRITE(6,992)
      MFAN(5,995)A,B,PCW,ADM
      WRITE(6,995)A,B,PCW,ADM
      IF(A,LT,100)GO TO 236
      MFAN(9,996)(MFAN(J),J=1,80)
      WRITE(6,996)(MFAN(J),J=1,80)
      MFAN(5,993)ALPHA,ISM,ISY,ICN
      WRITE(6,993)ALPHA,ISM,ISY,ICN
      IF(ALPHA,NE,C(10))GO TO 237
      IF(ICN,GT,60)GO TO 238
      MFAN(5,991)ALPHA,COST,PT,PT,LT,INL
      WRITE(6,991)ALPHA,COST,PT,PT,LT,INL
      IF(ALPHA,NE,C(1))GO TO 30
      C C C
      CALCULATE MAJOR FND ITEM PAYMENTS/ENGINEFS - ITEM A
      IF(PT,NE,0)AND,COST,NE,0)GO TO 22
      WRITE(6,973)
      GO TO 20
      22 IF(LT,LT,PT)GO TO 23
      WRITE(6,972)
      GO TO 20
      23 IF(PT,NE,0)WRITE(6,967)
      END
      VS=6.
      PR=PT-LT
      LT=LT-1
      L2=LT-PT-1
      DO 25 I=1,LT,L2
      X=100./PT
      X50=80/X-2
      Y=100/I-EXP(-X50R/I)/100.

```

IF(10L-EQ.0)GO TO 24
 PS(7,1)=PS(7,1)+(VOCUST-YS)*PCW
 24 PS(1,1)=PS(1,1)+VOCUST-VS
 25 VS=VOCUST
 GO TO 20

30 IF(ALPHA.NE.C(2))GO TO 50

C C C

CDARE PARTS/AUJONICS - ITEM H

IF(PT.NE.0.AND.CNST.NE.0.)GO TO 3A
 WRITE(6,973)
 GO TO 20

3A IF(LT.LT.PT)GO TO 40
 WRITE(6,972)
 GO TO 20

40 PT=PT-LT
 IP2=PT/3

IP1=(PT-IP2)/2

L1=L1.1

L2=L1.1P1-1

X=(CONST0.5)/IP1

GO 42 L=L1.L2

42 PS(2,1)=PS(2,1)+X
 L=L2.1

L2=L2.1P1

X=(CONST0.3)/IP1

GO 44 L=L1.L2

44 PS(2,1)=PS(2,1)+X
 L=L2.1

L2=L2.1P2

X=(CONST0.2)/IP2

GO 46 L=L1.L2

46 PS(2,1)=PS(2,1)+X
 GO TO 20

50 IF(ALPHA.NE.C(3))GO TO 60

C C C

CONJUNT HANDLING BUFFLS - ITEM C

IF(CNST.NE.0.)GO TO 56
 WRITE(6,973)
 GO TO 20

56 LT=LT.1

PS(3,1)=PS(3,1)+CNST

PS(7,1)=PS(7,1)+CNST*PCW

GO TO 20

60 IF(ALPHA.NE.C(4))GO TO 70

C C C

CONJUNT AND FLIGHT DISK INSURANCE - ITEM D


```

WRITE(6,946)
IF(COST.NE.0.160)GO TO 96
WRITE(6,973)
GO TO 20

66 L=LT+1
PS(3:1)=PS(3,LT)+COST
GO TO 20

70 IF(ALPHA.NE.C(5))GO TO 80

C C C
MISCELLANEOUS ITEMS - ITEM F

L1=1
L2=6
NC=IDL
IF(NE.LT.1.OR.NE.GT.1CD)GO TO 235
75 REAN(5,997)(P(1),L1,L2)
GO TO 1=1,L2
78 PS(4,1)=PS(4,1)+P(1)
IF(L2.GE.NC)GO TO 20
L1=L2+1
L2=L1+5
IF(L2.GT.NC)12=NC
GO TO 75
80 IF(ALPHA.NE.C(6))GO TO 100

QUALITY ASSURANCE SUPPORT - ITEM F

K=0
I=PT
IF(COST)92,94,92
92 PS(5,1)=PS(5,1)+COST
10L=IDL-1
GO TO 95
94 J=J+1
K=1
95 IF(P(1))96,99,96
96 J=J+IDL
IF(10L.LE.0)10L=1
X=PT/IDL
L2=1+10L-1
GO 98 J=1,L2
98 PS(5,J)=PS(5,J)+X
GO TO 20
99 IF(K.FO.1)WRITE(6,970)
GO TO 20

C
100 IF(ALPHA.EQ.C(10))GO TO 110
WRITE(6,979)ALPHA
GO TO 240

```

```

110 NN 130 J01.1CN
    X00.
    X00.PS(1.0).PS(2.0).PS(3.0).PS(4.0).PS(5.0)
    PS(6.0).X00
C
C
C
    CALCULATE MONTHLY PACKING, CRATING AND HANDLING CHARGE
    PS(7.0).PS(7.0).PS(2.0).X00
    PS(7.0).PS(7.0).PS(4.0).X00
C
C
C
    CALCULATE ADMINISTRATIVE CHARGE
    PS(8.0).X00
C
C
C
    ACCUMULATE MONTHLY TOTALS
130 PS(9.0).X00.PS(7.0).PS(8.0)
C
C
C
    DETERMINE INITIAL PAYMENT
    R000F=0.
    L1=154
150 IF(L1.GT.12) L1=L1-12
    IF(L1.GT.3) GO TO 152
    L2=L1-1
    GO TO 160
152 IF(L1.GT.6) GO TO 154
    L2=L1-1
    GO TO 160
154 IF(L1.GT.9) GO TO 156
    L2=L1-1
    GO TO 160
156 L2=L1-1
160 NN 162 I=1.60
162 P(1)=I
    NN 165 I=1.62
165 P(1)=P(1)+PS(9.0)
    R000F=R000F+P(1)-IDINT(P(1))
    P(1)=IDINT(P(1))
    INIT=L2
C
C
C
    SUM UP QUARTERLY PAYMENTS
    J01
170 L1=L2+1
    L2=L2+3
    J01
    IF(L2.LT.1CN) GO TO 175
    L2=1CN

```



```

175 DO 100 I=1,L2
180 P(J)=P(J)+PS(9,I)
      RNDP=RNDP+(P(J)-INT(P(J)))
      P(J)=INT(P(J))
      IF(L2.NE.1CD)GO TO 170
      TC=0.
      DO 190 I=1,J
190 TC=TC+P(I)
      TC=TC-RNDP
      P(J)=P(J)+RNDP
      Z=TC-COST
195 ENTR=J
      PRINT MONTHLY ACCUMULATIONS
      C
      C
      C
      PC=PC+PC*100
      ADM=ADM+100
      WRITE(6,989) (MEAN(J),J=1,89)
      WRITE(6,988) MON(15M)+TSY,PC*ADM
      WRITE(6,981)
      WRITE(6,987)
      M=15M
      M=15Y
      DO 210 I=1,1CD
      WRITE(6,986) MON(M),N,(PS(J,I),J=1,9)
      M=M+1
      IF(M-12)210,210,200
200 M=M-12
      M=M+1
210 CONTINUE
      PRINT PAYMENT SCHEDULE
      C
      C
      C
      WRITE(6,985)
      WRITE(6,978)
      M=15Y
      M=15M
      WRITE(6,984) MON(M),N,P(1)
      M=M+INIT-3
      DO 230 I=2,KNT
      IPAY=1-I
      M=M+J
      IF(M-12)230,230,225
225 M=M-12
      M=M+1
      WRITE(6,983) IPAY,MON(M),N,P(1)
      WRITE(6,978)
      WRITE(6,982) TC
      WRITE(6,977) COST,

```

WRITE (6.980) PCH.ADM
WRITE (6.994)
GO TO 240
235 WRITE (6.971)
GO TO 240
236 WRITE (6.974)
GO TO 240
237 WRITE (6.975)
GO TO 240
238 WRITE (6.976)
240 STOP
END

//

APPENDIX B
SAMPLE OF PROGRAM OUTPUT

DATA FOR PROGRAM FMSPSI

	101.0000000000	0.000415192	0.0350	0.0200	
			04	TESTOPTA	SET
A	1535000.00	0.00	24	3	0
B	160000.00	0.00	15	3	1
C	212000.00	0.00	24	3	0
D	17000.00	0.00	0	6	0
E	4000.00	0.00	0	3	0
F	10000.00	0.00	0	3	8
	1991291.00	800.00	24	3	3
		0.00	0	0	0

PC&M CALCULATED FOR THIS ITEM

NO PC&M CALCULATED FOR THIS ITEM

MASTER PAYMENT SCHEDULE MATRIX
DA TESTUPIA SET

PC&H - 3.500% ADMIN - 2.000%

CASE IMPLEMENTATION DATE: AUG 1977

MONTH	A	B	C & D	E	F	SUBTOTAL	PC&H	ADMIN	TOTALS
AUG 1977	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SEP 1977	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OCT 1977	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NOV 1977	21237.52	15142.86	4000.00	0.00	0.00	40380.37	708.40	807.61	41896.38
DEC 1977	61746.52	15142.86	0.00	0.00	0.00	76909.38	1032.14	1538.19	79479.71
JAN 1978	94667.01	15142.86	0.00	0.00	0.00	111789.87	1266.71	2239.80	115496.38
FEB 1978	124008.08	15142.86	17000.00	0.00	0.00	156150.94	1976.84	3123.02	161250.79
MAR 1978	142120.04	15142.86	0.00	100.00	0.00	157362.92	1378.68	3145.26	161886.85
APR 1978	151321.34	15142.86	0.00	0.00	0.00	166564.19	1284.12	3429.28	171077.60
MAY 1978	152448.95	15142.86	0.00	0.00	0.00	167811.81	1137.93	3356.24	172305.98
JUN 1978	147699.44	9085.71	0.00	0.00	0.00	156785.15	766.92	3135.70	160687.78
JUL 1978	138055.32	9085.71	0.00	0.00	0.00	147141.05	623.50	2942.82	150707.37
AUG 1978	125259.24	9085.71	0.00	0.00	0.00	134344.99	510.35	2686.90	137512.24
SEP 1978	110622.02	9085.71	0.00	0.00	0.00	119707.73	430.37	2394.15	122532.26
OCT 1978	94228.92	9085.71	0.00	0.00	0.00	104314.63	379.03	2086.29	106779.95
NOV 1978	79079.07	9085.71	0.00	0.00	0.00	88164.78	318.00	1763.30	90246.08
DEC 1978	65091.41	9085.71	0.00	0.00	0.00	74177.13	318.00	1483.54	75978.67
JAN 1979	52181.44	6057.14	0.00	0.00	0.00	58238.79	212.00	1164.78	59615.56
FEB 1979	40772.54	6057.14	0.00	0.00	0.00	46829.68	212.00	936.59	47978.28
MAR 1979	31049.32	6057.14	0.00	0.00	0.00	37126.47	212.00	742.53	38081.00
APR 1979	23100.92	6057.14	0.00	0.00	0.00	29158.06	212.00	583.16	29953.22
MAY 1979	16765.64	6057.14	0.00	0.00	400.00	23222.80	212.00	464.46	23899.26
JUN 1979	11881.57	6057.14	0.00	0.00	400.00	18338.71	212.00	366.77	18917.49
JUL 1979	8223.40	6057.14	0.00	0.00	10000.00	2460.54	212.00	485.61	24978.16

PAYMENT SCHEDULE

PAYMENTS	DATE	AMOUNTS
INITIAL	AUG 1977	41896.00
1	DEC 1977	396226.00
2	MAR 1978	505270.00
3	JUN 1978	448937.00
4	SEP 1978	319558.00
5	DEC 1978	183572.00
6	MAR 1979	91933.00
7	JUN 1979	93899.00

CALCULATED TOTAL	1991291.00
TOTAL FROM DD FORM 1513	1991291.00
DIFFERENCE	-0.00

LEGEND: A - MAJOR FND ITEM/SPARE ENGINES
 B - SPARE PARTS FOR FND ITEM/AUTONICS
 C - GROUND HANDLING WHEELS/FLIGHT INSURANCE
 D - MISCELLANEOUS ITEMS NOT INCLUDED ABOVE
 E - QUALITY ASSURANCE SUPPORT (POSTSHIPMENT INSP TEAM/QUALITY ASSURANCE TEAM)
 F - PACKING, CRATING, AND SHIPPING CHARGES (ON ITEMS A, B, C, D, E, & F = 3.500%)
 ADMIN - ADMINISTRATIVE CHARGES (ON ITEMS A, B, C, D, E, & F = 2.000%)

APPENDIX C
USER'S GUIDE

APPENDIX C

USER'S GUIDE

for the Computer Program

FMSPS

(Foreign Military Sales Payment Scheduling)

William A. Oxandale

June 1977

US ARMY AVIATION SYSTEMS COMMAND
Systems Analysis Office
Developmental Systems Analysis Division
12th & Spruce Streets
St. Louis, Missouri 63166

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USER'S GUIDE

1. NAME. Foreign Military Sales Payment Scheduling (FMSPS)
2. DESCRIPTION. When a foreign government enters into an arrangement with the Army for the purchase of military equipment, a schedule of payments must be developed sufficient to cover the contract obligation at any time during the term of the arrangement. This computer program is designed to develop such a schedule of payments in a fast and easy to use manner.
3. METHODOLOGY. Recognizing that there are several types of equipment items involved, many requiring different methods of processing, the program handles the input data by item type. The program accepts data for each item type, determines the payment schedule for that item, and stores the result in a matrix. When all items are read in and processed, the program computes the packaging, crating and handling charges, and the administrative charges and enters them in the matrix also. The entire matrix is then printed out as a monthly schedule of anticipated contract obligations. Finally, the monthly totals are collected into a payment schedule which is compatible with the Army billing cycle and printed. Six types of items are identified for unique processing and output. They are as follows:
 - a. Type A Items. These are items which are payment scheduled using the AVSCOM termination curve formula $P = a(1 - \exp(-bT^c))$; where a and b are parameters, and P is the amount obligated at any time T. The equation approximates the way money is obligated during a typical manufacturing contract for a major item.
 - b. Type B Items. These are items which are payment scheduled using the 50-30-20% procedure. That is; 50% of the amount is scheduled during the first 1/3 of the payment period, 30% during the second 1/3, and 20% during the final 1/3.
 - c. Type C Items. These are items which are scheduled for a particular month and entered in one lump sum.
 - d. Type D Items. These are items which are like Type C except that no packaging, crating, or handling charges are added.
 - e. Type E Items. This is a miscellaneous category included to facilitate those items which are payment scheduled by any other method not in the program. The payment schedule for this type item is directly input as a set of consecutive entries.

f. Type F Items. Reserved for Quality Assurance Support; both Quality Assurance Teams. and Preshipment Inspection Teams.

4. INPUT DATA

a. Definitions of Terms. Use the following definitions to determine what data to use and how it will be interpreted by the program.

(1) Contracted Cost. The total cost for the sum of all units of a particular item as used on a Type Card.

(2) Procurement Time. The total procurement time, including administrative lead time for a particular item. Administrative lead time will be subtracted before the cost is distributed in the payment schedule. Payments will not be scheduled in the administrative lead time months (refer to example in 4a(3) below).

(3) Administrative Lead Time. The total number of months having no entry preceding the payment schedule for a particular item. For example, an item with a procurement time of 10 months and an administrative lead time of 3 months will have 3 months (counting the implementation month) with no entry and 7 succeeding months of scheduled payments.

(4) Quality Assurance Team (QAT). A lump sum amount for QAT which will be placed at the last month of the procurement time (the procurement time entered on the same card).

(5) Preshipment Inspection Team (PIT). This amount for PIT will be divided by the number of deliveries entered on the same card and scheduled from the last month of procurement (entered on the same card) forward. For example, if 10 deliveries are given, the PIT will be equally divided over the last 10 months of production. If QAT is also entered, then it will be entered in the last month of procurement and PIT will then be scheduled over one month less than the number of deliveries and immediately preceding the QAT. If only one delivery is indicated, both QAT and PIT will appear summed in the last month of procurement.

(6) Total Case Value. This is the case value taken from DD Form 1513 and entered as a comparison with the calculated total. The difference is printed out below the payment schedule. Normally, this variance will be very small. If there is a significant variation, the input cards should be checked to determine the problem.

b. Data Card Description. Data cards must be punched with the data entered in the correct columns. Otherwise, the program can read the card incorrectly. To aid in checking the input, a printout of the input data cards is provided on the first page of output. Use a decimal point only

when and where indicated. Some numbers are read by the computer with a decimal point, and some without, and they cannot be interchanged or error message will result and the run will be terminated by the computer. All data is right justified in the data field. This will occur if the card instructions given below are followed.

(1) Case Card 1. This card provides a reference set of alphanumeric characters for the program to use in identifying card types A through F. This card must be present. Note that 10 columns are specified even though only 6 characters are used. Columns 7, 8, 9 and 10 are left intentionally blank.

<u>Columns</u>	<u>Entry or Description</u>
1-10	"ABCDEF" is the entry.

(2) Case Card 2. This card enters the values of the parameters (a, b) used in the termination curve formula for Type A items. This card must be present in the deck.

<u>Columns</u>	<u>Entry or Description</u>
1-15	Parameter "a" (the decimal point must be in Column 5.
16-30	Parameter "b" (the decimal point must be in Column 20.
31-40	Packing, Crating, and Handling Charge rate. Do not enter the percentage, use the fractional form. Punch so that the decimal point is in Column 36.
41-50	Administrative charge rate. Do not enter the percentage, use the fractional form. Punch so that the decimal point is in Column 46.

(3) Case Card 3. The card contains one line of alphanumeric heading (80 characters) which will be centered at top of second page of input. Any characters punched will be printed. Do not use first 3 columns. This card must be present, even if blank.

(4) Case Card 4. Three initial case parameters. This card must be present in the deck.

<u>Columns</u>	<u>Entry or Description</u>
7-10	Number representing the month of case

ColumnsEntry or Description

implementation (1 through 12). Punch so that the last numeral is in Column 10 with no decimal point.

11-20

Last two digits for the implementation year. Punch so that the last numeral is in Column 20 with no decimal point.

21-30

Total Case Duration (in months). Equal to longest procurement time. Punch so that the last numeral is in Column 30 with no decimal point.

(5) Card Type A. Type A items are those which are to be payment scheduled using the AVSCOM termination curve formula. Typically, they will include equipment such as End Items, Engines, and Tool Sets.

ColumnsEntry or Description

3

"A" is the entry.

4-18

Contracted Cost for item. Punch so that the decimal point is in Column 16.

19-28

Blank. Not used for Type A items.

29-34

Procurement Time for item (months) including any administrative lead time from implementation month. Punch so that last numeral is in Column 34 with no decimal point.

35-40

Administrative Lead Time for item (months). Punch so that last numeral is in Column 40 with no decimal point.

46

Control Code. Punch a "1" only if PC&H is to be calculated and included for this item. Otherwise leave blank. Typically used for Tool Sets.

(6) Card Type B. Type B items are those which are to be payment scheduled using the 50%, 30%, 20% distribution method. Typically, they will include Spare Parts for end items or avionics.

<u>Columns</u>	<u>Entry or Description</u>
3	"B" is the entry.
4-18	Contracted Cost for item. Punch so that the decimal point is in Column 16.
19-28	Not used for Type B items.
29-34	Procurement Time for item (months), including any administrative lead time from implementation month. Punch so that last numeral is in Column 34 with no decimal point.
35-40	Administrative Lead Time for item (months). Punch so that last numeral is in Column 40 with no decimal point.

(7) Card Type C. Type C items are those which are to be entered in just one particular month during the payment schedule. Ground Handling Wheels are typical items.

<u>Columns</u>	<u>Entry or Description</u>
3	"C" is the entry.
4-18	Contracted Cost for item. Punch so that the decimal point is in Column 16.
19-28	Blank. Not used for Type C items.
29-34	Blank. Not used for Type C items.
35-40	Administrative Lead Time for item (months). Punch so that last numeral is in Column 40 with no decimal point.

(8) Card Type D. Type D items are exactly like Type C items except that no PC&H charges are calculated. Typically used for Ground and Flight Risk Insurance.

<u>Columns</u>	<u>Entry or Description</u>
3	"D" is the entry.
4-18	Contracted Cost for item. Punch so that the decimal point is in Column 16.

<u>Columns</u>	<u>Entry or Description</u>
19-28	Blank. Not used for Type D items.
29-34	Blank. Not used for Type D items.
35-40	Administrative Lead Time for item (months). Punch so that last numeral is in Column 40 with no decimal point.

(9) Card Type E. Type E items are exactly like Type C items except that any number of values up to 60 may be entered by month. This card keys the reading of following Type E data card(s) containing 6 numbers each (see 4b(10) below).

<u>Columns</u>	<u>Entry or Description</u>
3	"E" is the Entry
4-18	Blank. Not used for Type E items.
19-28	Blank. Not used for Type E items.
29-34	Blank. Not used for Type E items.
35-40	Control Code. Leave blank if both PC&H and Administrative changes are desired. Punch a "1" if only PC&H charges are desired and a "2" if only Administrative changes are desired, and a "3" if neither are desired.
41-46	Number of entries to be made on the follow- ing card(s). Punch so that last numeral is in Column 46 with no decimal point. The program counts all entries, including blanks so include administrative lead time blank entries in the number.

(10) Type E data Cards. Must immediately follow the Type E Card. Punch all values to be entered in desired months. There are 6 entries per card, count from left to right across the card and use as many cards as are needed. Count blank months as a zero entry. All entries after the last entry are considered to be zero. Below is the format for the first card. Additional months (after 6th) are punched using the same format for as many cards as are necessary.

<u>Columns</u>	<u>Decimal</u>	<u>Description (first card)</u>
1-12	Column 10	Value for first month on card.
13-24	Column 22	Value for second month on card.

<u>Columns</u>	<u>Decimal</u>	<u>Description (first card)</u>
25-36	Column 34	Value for third month on card.
37-48	Column 46	Value for fourth month on card.
49-60	Column 58	Value for fifth month on card.
61-72	Column 70	Value for sixth month on card.

(11) Card Type F. Type F items are Quality Assurance Support. There are two kinds, Quality Assurance Team (QAT), and Preshipment Inspection Team (PIT).

<u>Columns</u>	<u>Entry or Description</u>
3	"F" is the entry.
4-18	Contracted cost for QAT. Punch so that the decimal point is in Column 16.
19-28	Contracted cost for PIT. Punch so that the decimal point is in Column 28.
29-34	Procurement Time for item supported. Punch so that the last numeral is in Column 34 with no decimal point.
35-40	Administrative Lead Time for Item (months). Punch so that last numeral is in Column 40 with no decimal point.
41-46	Number of deliveries for item to be supported (used only when a PIT value is entered above).

(12) Termination Card. This card causes the termination of the data read, the final calculations, the monthly schedule matrix printout, and the case payment schedule output. The card must be included.

<u>Columns</u>	<u>Entry or Description</u>
3	Blank (essential).
4-18	Total case value as taken from Block 20 of DD 1513. Punch so that the decimal point is in Column 16.

5. RUN TIME PROCEDURE. Although the program FMSPS is written so that it is compatible with any system having a FORTRAN compiler, the procedure described here is for the IBM 360/65 using the WATFIV capability. The following steps are necessary in order to run FMSPS. First, the proper Job Control Language (JCL) cards must be assembled with the input data cards (and the program if it has not been stored in the computer library) to form the job deck. Second, the job deck must be entered in the computer. And third, the output is obtained and checked for correctness.

a. JCL Cards. There are eight cards required to cause the IBM-360/65 computer to execute the FMSPS program using WATFIV and the source program stored in the computer. Included with the data cards, the necessary sequence is as follows:

```
//FPSWAO      JOB      (2T03,F030,,20),'NAME',REGION=155K
//              EXEC    WATFIV
//GO,FT05F001  DD      DSNAME=F.FMSPS,DISP=SHR,UNIT=DISK,VOL=SER=
                  DFSE02
//              DD      DDNAME=ENTRY
//GO.ENTRY     DD      *
$ENTRY
(DATA CARDS)
$STOP
$STOP
/*
```

b. Entering the Job. The job deck can be entered into the computer either directly in the computer room (by DMIS personnel), or through a remote terminal. If the deck is entered by computer operators in the computer room, the user will have to rely on the operator's knowledge. If a remote terminal such as the DATA 100 is used, then the user will need to learn the procedure for reading in the job deck. After the job deck has been entered the computer system will schedule the job in the system queue and processes it in turn.

c. Output. Normally, when the job has been processed, the output will be printed at the location where the input was entered (unless other

instructions have been given). The first page of the printout contains the report data as read by the computer. A comparison of this page with the input data will reveal most keypunch or other input data errors.

6. PROGRAM OUTPUT. The computer program output consists of three sections; the data list, the master payment schedule matrix, and the final payment schedule. Each will normally be one page, but large runs may cause additional pages to be printed.

a. Data List. The first section is a printout of the input cards, as read by the program. This enables the user to check the information actually used by the program to spot errors, omissions, and keypunch mistakes (numbers punched in the wrong columns).

b. Master Payment Schedule Matrix. This section shows the monthly payment accumulations from each card type as was scheduled by the program. There are also columns for monthly PC&H and Administration charges and two columns of totals. The matrix has one row for each month of case duration, and nine columns across.

c. Final Payment Schedule. The last section lists the schedule of payments according to the Army billing cycle. A grand total is provided at the bottom along with a check against the case total from the DD form 1513.

APPENDIX D
SUGGESTED WORKSHEET

FMSPS
SUGGESTED WORKSHEET

Card

1

ABCDEF

2

101.

0.00046152

(PC&H Rate)

(Admin Rate)

3

(Heading)

(Heading)

4

(Month)

(year)

(Duration)

5

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

last

(total Case)

D-2